

**Translation**

**PATENT COOPERATION TREATY**

**PCT**

**INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY**

(Chapter II of the Patent Cooperation Treaty)

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference <b>SHG 305</b>	FOR FURTHER ACTION See Form PCT/IPEA/416	
International application No. <b>PCT/DE2004/001439</b>	International filing date (day/month/year) <b>06.07.2004</b>	Priority date (day/month/year) <b>22.07.2003</b>
International Patent Classification (IPC) or national classification and IPC <b>F28D7/06, F28F9/013, F28F9/22</b>		
Applicant <b>ALSTOM POWER ENERGY RECOVERY GMBH</b>		

1.	This report is the international preliminary examination report, established by this International Preliminary Examining Authority under Article 35 and transmitted to the applicant according to Article 36.
2.	This REPORT consists of a total of <u>6</u> sheets, including this cover sheet.
3.	This report is also accompanied by ANNEXES, comprising: <ul style="list-style-type: none"> <li>a. <input type="checkbox"/> (sent to the applicant and to the International Bureau) a total of _____ sheets, as follows:             <ul style="list-style-type: none"> <li><input type="checkbox"/> sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications authorized by this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions).</li> <li><input type="checkbox"/> sheets which supersede earlier sheets, but which this Authority considers contain an amendment that goes beyond the disclosure in the international application as filed, as indicated in item 4 of Box No. I and the Supplemental Box.</li> </ul> </li> <li>b. <input type="checkbox"/> (sent to the International Bureau only) a total of (indicate type and number of electronic carrier(s)) _____, containing a sequence listing and/or tables related thereto, in computer readable form only, as indicated in the Supplemental Box Relating to Sequence Listing (see Section 802 of the Administrative Instructions).</li> </ul>
4.	This report contains indications relating to the following items: <ul style="list-style-type: none"> <li><input checked="" type="checkbox"/> Box No. I Basis of the report</li> <li><input type="checkbox"/> Box No. II Priority</li> <li><input type="checkbox"/> Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability</li> <li><input type="checkbox"/> Box No. IV Lack of unity of invention</li> <li><input checked="" type="checkbox"/> Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement</li> <li><input type="checkbox"/> Box No. VI Certain documents cited</li> <li><input type="checkbox"/> Box No. VII Certain defects in the international application</li> <li><input type="checkbox"/> Box No. VIII Certain observations on the international application</li> </ul>

Date of submission of the demand	Date of completion of this report
Name and mailing address of the IPEA/EP	Authorized officer
Facsimile No.	Telephone No.

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International application No.

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Box No. I Basis of the report

1. With regard to the language, this report is based on the international application in the language in which it was filed, unless otherwise indicated under this item.
  - ☐ This report is based on translations from the original language into the following language \_\_\_\_\_ which is the language of a translation furnished for the purposes of:
    - ☐ international search (Rule 12.3 and 23.1(b))
    - ☐ publication of the international application (Rule 12.4)
    - ☐ international preliminary examination (Rule 55.2 and/or 55.3)
2. With regard to the elements of the international application, this report is based on *(replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report)*:
  - ☐ the international application as originally filed/furnished
  - ☒ the description:
    - pages 1-11 \_\_\_\_\_ as originally filed/furnished
    - pages\* \_\_\_\_\_ received by this Authority on \_\_\_\_\_
    - pages\* \_\_\_\_\_ received by this Authority on \_\_\_\_\_
  - ☒ the claims:
    - nos. 1-11 \_\_\_\_\_ as originally filed/furnished
    - nos.\* \_\_\_\_\_ as amended (together with any statement) under Article 19
    - nos.\* \_\_\_\_\_ received by this Authority on \_\_\_\_\_
    - nos.\* \_\_\_\_\_ received by this Authority on \_\_\_\_\_
  - ☒ the drawings:
    - sheets 1/7-7/7 \_\_\_\_\_ as originally filed/furnished
    - sheets\* \_\_\_\_\_ received by this Authority on \_\_\_\_\_
    - sheets\* \_\_\_\_\_ received by this Authority on \_\_\_\_\_
  - ☐ a sequence listing and/or any related table(s) – see Supplemental Box Relating to Sequence Listing.
3. ☐ The amendments have resulted in the cancellation of:
  - ☐ the description, pages \_\_\_\_\_
  - ☐ the claims, nos. \_\_\_\_\_
  - ☐ the drawings, sheets/figs \_\_\_\_\_
  - ☐ the sequence listing (*specify*): \_\_\_\_\_
  - ☐ any table(s) related to sequence listing (*specify*): \_\_\_\_\_
4. ☐ This report has been established as if (some of) the amendments annexed to this report and listed below had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).
  - ☐ the description, pages \_\_\_\_\_
  - ☐ the claims, nos. \_\_\_\_\_
  - ☐ the drawings, sheets/figs \_\_\_\_\_
  - ☐ the sequence listing (*specify*): \_\_\_\_\_
  - ☐ any table(s) related to sequence listing (*specify*): \_\_\_\_\_

\* If item 4 applies, some or all of those sheets may be marked "superseded."

## INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

International application No.

PCT/DE2004/001439

**Box No. V** Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

## 1. Statement

Novelty (N)	Claims 1-11	YES
	Claims	NO
Inventive step (IS)	Claims 1-11	YES
	Claims	NO
Industrial applicability (IA)	Claims 1-11	YES
	Claims	NO

## 2. Citations and explanations (Rule 70.7)

1. This report makes reference to the following document cited in the search report; the same numbering will be used throughout the procedure:

D1: US-A-5 915 465

2. **PCT Article 33(1)**

The present application meets the requirements of PCT Article 33(1) because the subject matter of claims 1-11 is novel and involves an inventive step (PCT Article 33(3)) in relation to the documents cited in the international search report.

2.1 **PCT Article 33(2)**

The technical features of claim 1 are not found in any of the documents cited in the international search report. The subject matter of claim 1 is therefore novel.

2.2 **PCT Article 33(3)**

Document D1 is considered to constitute the prior art closest to the subject matter of claim 1 and

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Box No. V

Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability;  
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discloses (figure 1; the references in parentheses are to that document):

a tubular heat exchanger having at least one channel through which a heating or cooling medium flows, in particular a heating gas, the pipes (2) in the bundle of pipes extending through the channel in a direction substantially parallel to the longitudinal axis of the channel, and the heating or cooling medium is guided in a zigzag, seen in the axial direction of the channel, through the channel having a substantially circular cross-section, through rings (15) and disks (15) which are alternatively arranged on and fixed to respective jacket walls (11, 12, 13) of the channel.

The outer pipes of the bundle of pipes (2) are supported and positioned by rings (15) fixed to the jacket wall (11, 12, 13) and the inner pipes of the bundle of pipes (2) in the gas channel are supported and positioned by disks (15) fixed to the jacket wall (11, 12, 13).

Proceeding from this prior art, the invention addresses the problem of providing a tubular heat exchanger in which each of the pipes of the bundle of pipes is securely supported inside the channels, and vibration resonance is avoided at the pipes in the bundle of pipes.

In order to solve this problem, the rings and

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disks are designed in at least one channel of the tubular heat exchanger according to the invention in such a way that each of them supports and receives the totality of pipes in a channel, the outer contour of the rings and disks following the centres of the respective outer or inner pipes in the bundle of pipes, on the medium flow side, and the outer contour comprises a limb which envelops all the outer and inner pipes. While maintaining the distance between two rings or disks, the previous support width of each pipe between two rings or disks is thus halved. This is advantageous for the lateral support, since each pipe is supported twice as often, in comparison with the prior art, without shortening the distances between two rings or disks, thus suppressing resonance vibration of the pipes. Since the special configuration of the rings and disks keeps the flow cross-section as large as possible on the flow side, the higher pressure losses which would be expected on the cooling medium side are reduced to a minimum.

This solution is neither known from nor suggested by the available prior art. The subject matter of claim 1 thus involves an inventive step (PCT Article 33(3)).

- 2.3 Claims 2-11 are dependent on claim 1 and thus also meet the PCT novelty and inventive step requirements.

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Box No. V	Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
3.	The subject matter of claims 1-11 is considered to be industrially applicable (PCT Article 33(4)).
4.	Contrary to PCT Rule 5.1(a)(ii), the description does not cite document D1 or indicate the relevant prior art disclosed therein.